Dynamic capacity control of autonomous waterborne vessels to transport passengers and freight

Problem description

In this thesis, the aim is to dynamically manage the homogenous fleet of these autonomous vessels for different services, that is, passenger and parcel transport. Under different demand scenarios, the fleet can be underutilized for passenger mobility. Therefore, parcels can be delivered during these timeslots. Real-time decisions need to be made for fleet sizing and dispatching the fleet to different services. The proposed approach will be applied for a case study in Norway where the service provider Hyke is offering innovative solutions for waterborne logistics and mobility, promising to alleviate congestion, eliminate emissions and enable sustainable waterfront redevelopment. Hyke's solutions include electric ferries, automatic charging jetties, autonomous vessel control, and fleet management solutions. Moreover, Hyke's solutions are designed to enable passenger and logistics operations, enabling economies of scale and increasing vessel utility and revenues.

Assignment

The project will involve the following steps:

- Identify different demand scenarios for both passenger and parcel last mile transport.
- Design a real-time dynamic fleet sizing for each service type (passengers and parcels)
- Introduce a real-time dispatching algorithm for an integrated network of passenger and parcel transport.

Candidate

- Should have: coding skills in Python, knowledge of optimization and heuristics methods.
- Good to have: behavioural modelling, reinforcement learning.

Research group

Sustainable Urban Multimodal mobility (**SUM**) Lab and the Smart Public Transport Lab (**SPTL**)

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